

# New decapod crustaceans from the Palaeogene of Jamaica

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## Abstract

Decapod crustaceans are poorly known from the Palaeogene of Jamaica and are only locally common in the Yellow Limestone Group (mid Lower–mid Middle Eocene). Three further taxa are documented herein. The thalassinidean “*Callianassa*” sp. (Swanswick Formation, White Limestone Group, upper Middle or Upper Eocene) is based on a single internal mould of a left fixed finger, but is not comparable with other “*Callianassa*” spp. from the Jamaican Palaeogene, all described from propodi lacking fingers. Other evidence of Palaeogene thalassinidean shrimps on the island is provided by the trace fossil *Thalassinoides*. The dynomenid *Trechmannius circularis* gen. et sp. nov. (Richmond Formation, Lower Palaeocene) has an almost circular, strongly vaulted carapace, with lateral margins feebly tuberculated, the front feebly produced and downturned, the orbitofrontal margin about two thirds of carapace width, and the cervical, postcervical and branchiocardiac furrows well developed. The closely related *Palaeodromites naglei* Bishop (Albian, Texas) is transferred to *Trachynotocarcinus* Wright and Collins. The carpiliid *Ocalina haldixoni* sp. nov. (Montpelier Formation, White Limestone Group, Middle or Upper Eocene) has a transversely ovate carapace with the front slightly produced and four lobed, obliquely directed circular orbits, and the anterolateral margins lined with nine or ten small tubercles leading onto short dorsal ridge.

*Key words:* Crustacea, Decapoda, Eocene, Jamaica, White Limestone Group, Richmond Formation

## Introduction

The mid-Cainozoic White Limestone Group is the most widely exposed lithological unit of Jamaica, occurring in outcrop over half the surface area of that island (Robinson, 1994). It is generally considered to range from the mid Middle Eocene to Middle or Upper Miocene, although there are Upper Palaeocene limestones in eastern Jamaica of similar lithology (Robinson, 1997). As noted elsewhere (Donovan *et al.*, 2003, p. 108; Donovan, 2004, p. 3), the White Limestone Group has been a difficult unit for the macropalaeontologist to exploit, the well-lithified, case-weathered limestones giving up their fossils only grudgingly. Like many other taxa, the fossil decapod crustaceans of this unit have been difficult to collect. In his review of the Jamaican fossil crustaceans, Morris (1993) noted only *Callianassa* sp. from the Palaeogene part of the White Limestone Group and indeterminate crab fragments from the Eocene Swanswick Formation, White Limestone Group. It is only with the recent publication of Portell and Collins (2004), in which 16 species were identified in 14 genera from the Lower Miocene Montpelier Formation, that the decapod crustaceans of the White Limestone Group have proved worthy of detailed attention.

The fragments from the Swanswick Formation mentioned by Morris, part of a limb, albeit not of a callianassid, from the locality discussed below, had been sent for identification by SKD, but it was damaged beyond repair in the post. Therefore, it is with some satisfaction that the first broadly identifiable, albeit very incomplete, decapod crustacean from the Swanswick Formation is recorded herein, referred to “*Callianassa*” sp.

The possible route of *Ocalina* from its apparently Tethyan origin was discussed by Collins and Donovan (2005). However, this opinion would seem to be strongly challenged by the appearance of *Ocalina haldixoni* sp. nov. from the White Limestone Formation. The relatively smooth dorsal surface of *O. haldixoni*, located more or less geographically midway between *Ocalina sublevis* Collins and Donovan, 2005, to the south (Bonaire) and *Ocalina floridana* Rathbun, 1929, has more in common with the oldest known species, *Ocalina straeleni* (Remy and Tessier, 1954), from which it differs in having small, but distinct, marginal tubercles.

No decapod crustaceans have been reported hitherto from the mainly siliciclastic succession of the Lower Palaeocene–Lower Eocene Richmond Formation of eastern Jamaica. *Trechmannius* is the second and oldest known fossil dynomenid crab to be described from the Caribbean; the first was recorded by Portell and Collins

(2004) from the Lower Miocene Montpelier Formation of Jamaica. In having three, well developed transverse grooves, *Trechmannius* is strongly reminiscent of some species in the largely Cretaceous genus *Palaeodromites* A. Milne Edwards, 1865, and, more particularly, to the Albian–Cenomanian genus *Trachynotocarcinus* Wright and Collins, 1972. A North American species, *Palaeodromites naglei* Bishop, 1983, from the Albian Glen Rose Formation of Texas, is similar in all essential respects to *Trachynotocarcinus* and is transferred to that genus (see below).

Specimens are deposited in Nationaal Natuurhistorisch Museum, Leiden, The Netherlands (RGM) and The Natural History Museum, London (BMNH).

Table 1. Decapod crustaceans from the Palaeogene of Jamaica (mainly extracted from Withers, 1924a; Morris, 1993; Donovan *et al.*, 2003, table 1).

Richmond Formation, ‘Moore Town Shales’ (Lower Paleocene)
Infraorder Brachyura
Family Dynomenidae
<i>Trechmannius cirularis</i> gen. et sp. nov.
Chapelton Formation <i>sensu lato</i> , Yellow Limestone Group (mid Lower–mid Middle Eocene)
Infraorder Thalassinidea
Family Callianassidae
“ <i>Callianassa</i> ” sp.
“ <i>Callianassa</i> ” <i>gigantea</i> Withers, 1924a
“ <i>Callianassa</i> ” <i>subplana</i> Withers, 1924a
“ <i>Callianassa</i> ” <i>trechmanni</i> Withers, 1924a
Infraorder Brachyura
Family Hepatidae
<i>Eriosachila bartholomaeensis</i> (Rathbun, 1919a)
Family Portunidae
<i>Callinectes jamaicensis</i> Withers, 1924a
Family Xanthidae
<i>Phymodius</i> cf. <i>maculatus</i> (Stimpson, 1860)
Family Grapsidae
<i>Varuna?</i> sp. <i>in</i> Withers (1924a)
<i>incerti ordinis</i>
indeterminate crab fragments <i>in</i> Morris (1993, p. 123)
Swanswick Formation, White Limestone Group (Middle–low Upper Eocene)
Infraorder Thalassinidea
Family Callianassidae
“ <i>Callianassa</i> ” sp.
<i>incerti ordinis</i>
indeterminate crab fragments <i>in</i> Morris (1993, p. 123)
Montpelier Formation, White Limestone Group ( <i>pars</i> upper Middle or Upper Eocene)
Infraorder Brachyura
Family Carpiliidae
<i>Ocalina haldixoni</i> sp. nov.
Formation unknown, White Limestone Group (Eocene or Oligocene?)
Infraorder Thalassinidea
Family Callianassidae
“ <i>Callianassa</i> ” sp.

## Systematic Palaeontology

Order Decapoda Latreille, 1802

  Infraorder Thalassinidea Latreille, 1831

    Superfamily Callianassoidea Dana, 1852

      Family Callianassidae Dana, 1852 *sensu lato*

        Genus *Callianassa* Leach, 1814

*Type species: Cancer (Astacus) subterraneus* Montagu, 1808, by monotypy.

*Remarks:* The fingers of thalassinidean shrimps are among the most common body fossils of decapod crustaceans (Bishop and Williams, 2005). We follow the suggestion of Collins *et al.* (1997, p. 52) to include indeterminate fossil callianassids in “*Callianassa*” sp. within the Callianassidae *sensu lato*.

### “*Callianassa*” sp.

(Fig. 1)

*Material:* A single specimen, RGM 188 698 (Fig. 1), a left fixed finger.

*Locality and horizon:* Pimento Hill, Beecher Town, parish of St. Ann, east central Jamaica (approximate NGR 766 317; new 1:50,000 (metric edition) topographic sheet 4, ‘St Ann’s Bay - Ocho Rios’) (Donovan *et al.*, 1989, fig. 1). Pimento Hill was formally owned by the late Mr. W. F. Schickler, who encouraged palaeontological fieldwork on his property (Donovan, 2002). Although originally mapped as Miocene Montpelier Formation, White Limestone Group (Henry and McFarlane, 1978), it was subsequently shown to be Eocene on the basis of the included echinoids (Donovan *et al.*, 1989) and placed within the Swanswick Formation, White Limestone Group (R. M. Wright *in* Donovan and Gordon, 1989, p. 53). The Swanswick Formation is upper Middle to lowest Upper Eocene (Bartonian–lowest Priabonian) (Robinson, 1994, fig. 6.6; Robinson

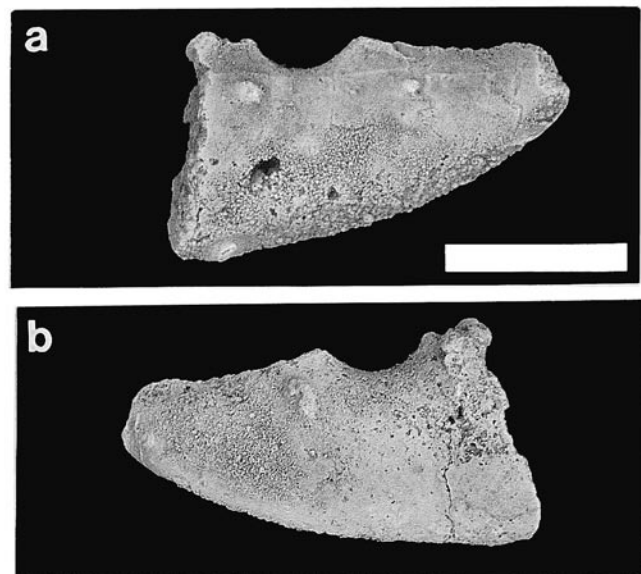


Fig. 1. “*Callianassa*” sp., RGM 188 698, left fixed finger, Swanswick Formation (Eocene, probably Bartonian), Beecher Town, parish of St. Ann, Jamaica. a, inner surface. b, outer surface. Scale bar represents 5 mm.

and Mitchell, 1999; Mitchell, 2004, fig. 8).

*Description:* Left fixed finger preserved as an internal mould. About twice as high as wide and twice as long as high. Broadly triangular with a broken tip, curved lingually, blade-like with an oval section. Lower margin curved and ridged; occludent margin slightly irregular, with a distinct scalloping in the proximal half. This indentation is flanked by two tubercles, one on either side, on the outer surface (Fig. 1b). Similarly, two smaller tubercles occur in similar, but not identical, positions on the inner surface (Fig. 1a); two longitudinal, incomplete, sub-parallel ridges occur between these tubercles and the lower surface. Cratering of some tubercles may have been sites of attachment for setal pores (Fig. 1).

*Discussion:* Decapod crustaceans have a poor fossil record in the Palaeogene of Jamaica. Donovan *et al.* (2003) listed taxa from only two Palaeogene units, the Chapelton Formation, Yellow Limestone Group (Lower–Middle Eocene) and from the Eocene–Oligocene of the White Limestone Group (formation unknown) (Table 1). Decapods were previously unknown from the Palaeocene of the island (but see below), although the presence of the ichnofossil *Thalassinoides suevicus* (Rieth) in shallow water sedimentary facies of the siliciclastic succession of the Lower Palaeocene–Lower Eocene Richmond Formation suggests that they were present in marginal to shallow marine palaeoenvironments (= *Thalassinoides* ichnocoenosis) (Pickerill and Donovan, 1991; Pickerill *et al.*, 1992). However, *Thalassinoides* is not known from the Swanswick Formation (Blissett and Pickerill, 2004). The greatest diversity of decapod body fossils is known from the Eocene, but, again, they are unknown from the Oligocene. The specific diversity of callianassids from the Eocene of Jamaica is approximately equal to all other decapod taxa combined.

Direct comparison between RGM 188 698 and other callianassids from the Palaeogene of Jamaica is precluded by the mouldic preservation of the former and the non-preservation of fingers of the latter (Withers, 1924a). Even where fixed fingers are preserved, on specimens from the Palaeogene elsewhere in the Caribbean region (e.g., Panama Canal Zone, Rathbun, 1919a, b; Anguilla, Withers, 1924b; Barbados, Withers, 1926), comparison is inconclusive.

Infraorder Brachyura Latreille, 1802  
 Section Podotremata Guinot, 1977  
 Subsection Dromioidea de Haan, 1833  
 Superfamily Dromioidea de Haan, 1833  
 Family Dynomenidae Ortmann, 1892  
 Genus *Trechmannius* gen. nov.

*Etymology:* For Charles Taylor Trechmann (1884–1964), the noted Caribbean palaeontologist (Donovan, 2003), who collected some of the first Palaeogene decapods to be documented from Jamaica (Withers, 1924a, p. 81) and made significant contributions to our knowledge of the palaeontology of the Richmond Formation (e.g., Trechmann, 1924).

*Type species:* *Trechmannius circularis* gen. et sp. nov.

*Diagnosis:* Carapace almost circular in outline, lateral margins

feebly tuberculated, strongly vaulted; front feebly produced and downturned, orbitofrontal margin about two thirds of carapace width; cervical, postcervical and branchiocardiac furrows well developed.

***Trechmannius circularis* sp. nov.**

(Figs. 2.4–6)

*Etymology:* Referring to the outline of the carapace.

*Material:* Holotype, BMNH IC 452, a carapace.

*Locality and horizon:* Fellowship, parish of Portland, northeast Jamaica (approximate NGR 071 651; new 1:50,000 (metric edition) topographic sheet 14, ‘Port Antonio’; for locality map, see Donovan *et al.*, 1990, figs. 1, 3). Richmond Formation, ‘Moore Town Shales’ of Jiang and Robinson (1987, pp. 42–44); Lower Palaeocene (NP1). This is a river cliff section in a thin-bedded, turbiditic sandstone-shale succession deposited in deep water and exhibiting partial Bouma sequences (Donovan *et al.*, 1990, p. 56, fig. 2C). Trace fossils are moderately diverse (Pickerill and Donovan, 1991). Body fossils occur in thin shell lags on the soles of sandstones and are small or fragmentary only (e.g., Donovan and Veltkamp, 1992).

*Diagnosis:* As for the genus.

*Description:* Carapace almost circular in outline (Fig. 2.4), widest about midlength, strongly vaulted in transverse and longitudinal sections (Fig. 2.6). The ovate orbits take up the outer thirds of the orbitofrontal margin which occupies two thirds of the carapace width (Fig. 2.5). The front is weakly produced, downturned and broadly triangular; a broad, shallow median notch leads back as a thin sinus across a narrow postfrontal depression and, dividing round the tip of a distally tapering anteromesogastric process, extends to midlength of small, ovate epigastric lobes. Thickened sides of front curve to thin, raised, oblique upper orbital margins. Transverse lower orbital margins are slightly in advance of the upper. The outer orbital angle forms a sharp corner rather than a spine. Short, thickened anterolateral margins have five or six minute tubercles (seen to advantage on the left-hand side of the frontal view; Fig. 2.5) and terminate at a weak cervical notch; behind the branchiocardiac furrow is a larger tubercle. The lateral and posterolateral margins curve smoothly into the posterior angles and a narrow, rimmed posterior margin. The cervical furrow crosses the midline in a broad V posterior to mid-carapace length, and runs gently forward and outward to the margin. The broader and shallower hepatic furrow becomes obsolete before reaching mid-orbital margin length. A rather more sinuous metabranchial (=postcervical) furrow runs more or less parallel to the cervical and separates a slightly constricted epibranchial lobe from a mesobranchial lobe, and continues as a straight line behind the urogastric lobe. The branchiocardiac furrows are transverse to the cardiac region, then turn to embrace that region. There is a suggestion of a fourth transverse furrow extending towards the margin from the widest part of the cardiac region.

Triangular protogastric lobes are tumid towards the midline; the urogastric forms a pair of oblique lobes parallel to the rhombic

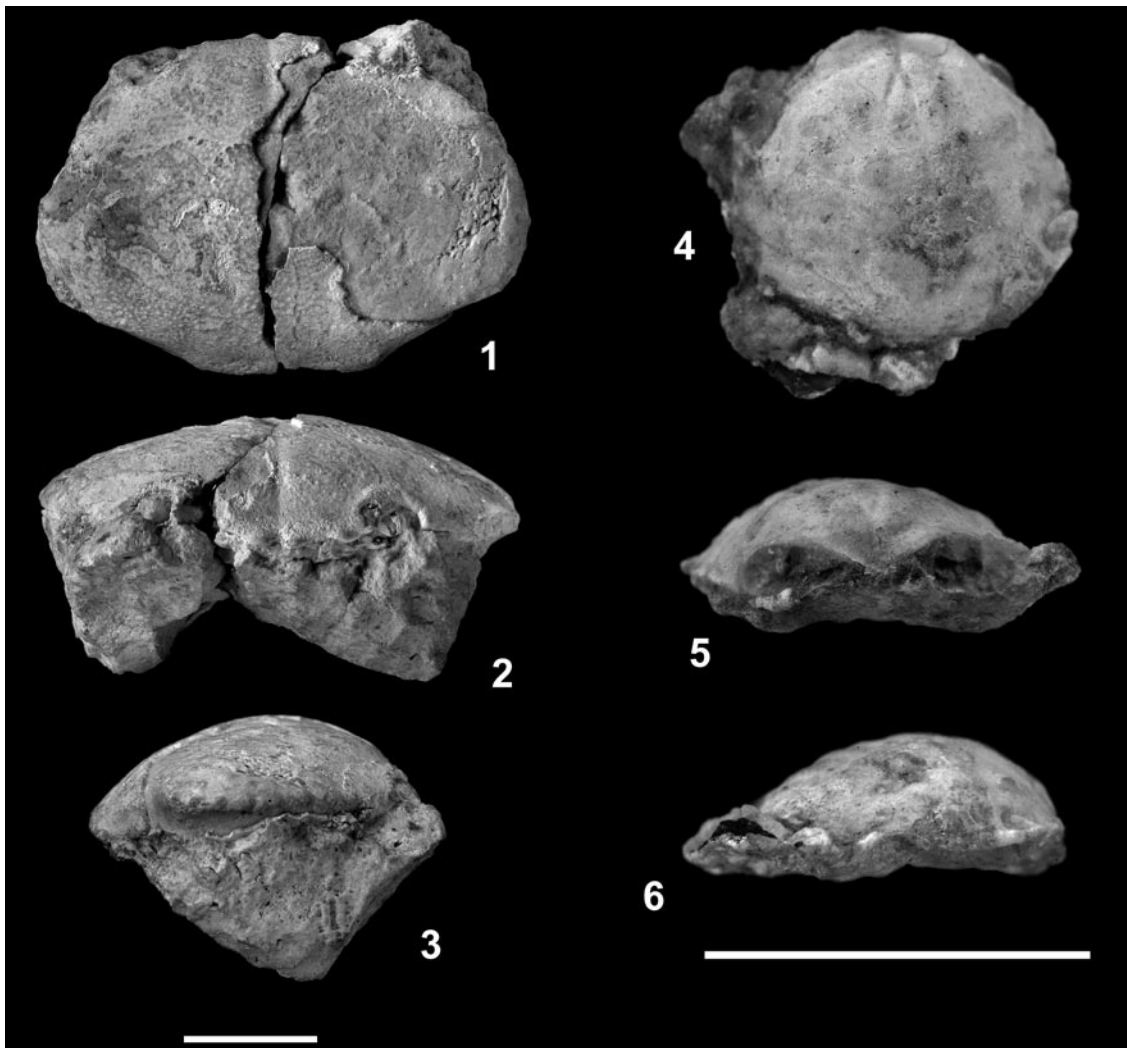


Fig. 2. New species of decapod crustaceans from the Paleogene of Jamaica. 1–3. *Ocalina haldixoni* sp. nov., BMNH In. 60530, holotype, upper Middle or Upper Eocene of the White Limestone Group, Port Antonio, parish of Portland, carapace. 1, dorsal view. 2, anterior view. 3, right lateral view. Scale bar represents 10 mm. 4–6. *Trechmannius circularis* gen. et sp. nov., BMNH IC 452, holotype, Lower Paleocene of the Richmond Formation, Fellowship, parish of Portland, carapace. 4, dorsal view. 5, anterior view. 6, right lateral view. Scale bar represents 5 mm. All specimens coated with ammonium chloride for photography.

mesogastric lobe; the small cardiac region is subcircular in outline and an intestinal lobe is barely differentiated. There is a weak tubercle close to the midline at the base of each protogastric lobe anterior and median to the tubercles on each epibranchial lobe.

*Discussion:* Attention was drawn above to the similarity of *Trechmannius* to both *Palaeodromites* and *Trachynotocarcinus*. While most species of *Palaeodromites* have a more or less circular outline, and are therefore closer in that respect to *Trechmannius*, they have, with one exception, a considerably less well developed postcervical furrow essential to *Trachynotocarcinus*. The exception, *Palaeodromites naglei* Bishop, 1983, from the Lower Albian Glen Rose Formation of central Texas, has a well developed postcervical furrow and fourth furrow, both illustrated and mentioned in the original description; this, latter, furrow is weaker in *Trachynotocarcinus sulcatus* (Bell, 1863) and is seen more as a line dividing tubercles. These differences clearly separate *naglei* from *Palaeodromites* and the species is here reassigned to

*Trachynotocarcinus*. There is just a suggestion of a fourth furrow on *Trechmannius*. In contrast to the feebly tuberculated lateral margins of *Trechmannius*, the margins of *Trachynotocarcinus* and *Palaeodromites* are strongly emarginate.

Section Heterotremata Guinot, 1977  
Superfamily Xanthoidea MacLeay, 1838  
Family Carpiliidae Ortman, 1893  
Genus *Ocalina* Rathbun, 1929

*Type species:* *Ocalina floridana* Rathbun, 1929, p. 2, by monotypy (Upper Eocene, Florida).

*Diagnosis:* See Glaessner (1969, p. R520).

*Range:* Middle to Upper Eocene.

***Ocalina haldixoni* gen. et sp. nov.**

(Figs. 2.1–3)

*Etymology:* In honour of our late colleague, Harold L. Dixon.

**Material:** Holotype, BMNH In. 60530 (Trechmann Bequest), part cast and part decorticated carapace.

**Locality and horizon:** From the upper Middle or Upper Eocene of the White Limestone Group of Crab Hill, Port Antonio, parish of Portland, northeastern Jamaica. This is presumed to be the hill above Crab Point, to the west of the town (approximate NGR 063 705; Jamaica 1:50,000 (metric edition) topographic sheet 14, 'Port Antonio). McFarlane (1977) showed the limestones in this area to belong to the Gibraltar–Bonny Gate Formation of the mid Tertiary White Limestone Group, part of the Montpelier Formation as revised by Mitchell (2004, p. 27).

**Diagnosis:** Carapace transversely ovate; front slightly produced, four lobed; obliquely directed circular orbits; anterolateral margins lined with nine or ten small tubercles leading onto short dorsal ridge.

**Description:** Carapace transversely subovate (Fig. 2.1), length about two thirds carapace width (68.9 %), widest about one third distant from the front, gently arched in transverse section; in longitudinal section it is strongly downturned in its anterior third, moderately so posteriorly (Fig. 2.3). The orbitofrontal margin occupies a little less than two thirds (58.7 %) of the carapace width, of which the slightly produced, smooth front takes up a half (Fig. 2.2); a deep U-shaped median notch is emphasised by thickened frontal nodes, the sides curving to a blunt tubercle close to a rounded inner orbital angle. The upper orbital margin is thickened and (as preserved) lined with incipient granules. Circular orbits are obliquely directed. There is a shallow postfrontal depression. The convex anterolateral margins, about half the length of the carapace, are lined with nine or ten more or less even-sized, bluntly rounded tubercles continuing onto a short dorsal ridge. Straight posterolateral margins converge at about 30° to the carapace midline to sharp(?) posterior angles; the (damaged) posterior margin is bounded by a broad ridge.

As preserved, the frontal notch leads back as a broad sinus some distance onto the dorsal surface before broadly dividing. Protogastric lobes are weakly differentiated. Numerous blunt granules of several diameters crowding the dorsal surface become coarser and sparser towards the margins.

**Discussion:** An aggregate of carapace ratios compares most closely with those obtained from *Ocalina* Rathbun, 1929, discussed by Schweitzer (2003) and Collins and Donovan (2005, p. 7), described subsequently, than other genera within the Carpiliidae (Table 2). The main differences of the new Jamaican taxon from the type species, *O. floridana* Rathbun, are the absence of the lobular

sculpture of the dorsal surface and tuberculate margins, as opposed to the same number of lobules. *Ocalina sublevis* Collins and Donovan, 2005, from the Middle to Upper Eocene Montagne Formation of Bonaire, has a similar number of marginal spines, but a partially lobate dorsal surface; the orbital margin notches noted in the original description (p. 6) are probably no more than accentuated divisions between granular sculpture. *Ocalina straeleni* (Remy and Tessier, 1954), from the Lower Lutetian (low Middle Eocene) of Senegal, has an almost smooth dorsal surface and the marginal spines are limited to vague tubercles.

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“*Callianassa*” sp. was collected by the late Harold L. ‘Hal’ Dixon (formerly University of the West Indies, Mona) in September 1997. We thank Phil Crabb (Photographic Unit, The Natural History Museum, London (BMNH)) for taking the photographs. Roger W. Portell (Florida Museum of Natural History, Gainesville) is thanked for his supportive review. This is a contribution to SKD’s Nationaal Natuurhistorisch Museum, Leiden project “Caribbean palaeontology”.

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Table 2. Measurements and ratios of *Ocalina* spp. from the Eocene of the tropical western Atlantic.

	<i>Ocalina floridana</i>	<i>Ocalina straeleni</i>	<i>Ocalina sublevis</i>	<i>Ocalina haldixoni</i>
Length/carapace width %	68.2	59.2	63.6	68.9
Orbitofrontal margin/carapace width %	53.1	54.3	45.7	58.7
Front/carapace width %	37.9	36.7	37.1	40.1
Widest point from front/carapace length %	57.7	55.1	54.1	58.0
Angle posterolateral margin to midline	32°	35°	35°	30°

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